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TIMING OF THE SPRING MIGRATION OF THE SONG THRUSH *TURDUS PHILOMELOS* THROUGH SOUTHERN ITALY

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ABSTRACT

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We studied the population trend and movements of the Song Thrush during the winter near the Tyrrhenian coast in the region of Latium, from 2012 to 2014, in order to establish the timing of spring migration.

During standardized mist-netting we captured and ringed 431 birds. The data collected indicate that the study area is mainly visited by wintering thrushes with significant year-to-year fluctuations in the number of birds.

Based on the information gathered during this study, confirmed by the results of other studies carried out in southern Italy and France, we assume that spring migration starts in Latium between the second and third decade of February.

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INTRODUCTION

The Song Thrush *Turdus philomelos* is a migratory and wintering species in Italy. The birds overwintering in the Mediterranean region arrive mainly in October, but continue to arrive throughout the autumn. Winter movements, mostly caused by climatic conditions and food availability, are common in southern Europe and in the Middle East (Andreotti *et al*. 2010).

Based on information provided to the European Commission by ISPRA (Spina and Serra 2003, Andreotti *et al*. 2004, Spina and Volponi 2008), supported by analysis

of non-standardized ringing and recoveries made in Italy over a period of about twenty years, pre-nuptial migration begins in the second decade of January. According to Andreotti *et al*. (2010), in the southern wintering areas early northward movements begin in January and last until the middle of April. On the other hand, Macchio *et al*. (1999), based on trapping activity in Italy in the years 1980-1994, state that spring migration takes place from February, which is also suggested by the trend of the annual index of abundance. Licheri and Spina (2002) also report that ringing data collected in Italy in the years 1982-1999 show that return migration is mainly from February to April. A few birds are still present at the end of May.

Therefore when analysing the results of the present three-year study programme we assumed that the beginning of spring migration is in the second/third decade of February.

STUDY AREA

Fieldwork was carried out at Pianara (41°21'N, 13°27'E), a site in the southern part of Agro Pontino, not far from the coast line (7 km from the Gulf of Gaeta), about halfway between Rome and Naples. The ringing station was located in a hilly area in the Natural Park of the Aurunci Mountains. The area has extensive cultivation of olive trees and abandoned crops mixed with Mediterranean maquis. Vegetation at the trapping site consists of Mediterranean maquis elements such as *Pistacia lentiscus*, *Smilax aspera*, *Olea europea*, *Phillyrea latifolia*, *Spartium junceum*, *Crataegus monogyna*, *Prunus spinosa and Pistacia terebinthus in association with Quercus ilex*, *Quercus pubescens*, *Ulmus minor*, *Quercus suber and Laurus nobilis*.

MATERIAL AND METHODS

The three-year project (2012-2014) was based on standardized mist-netting beginning in the second decade 10-days period of January and lasting until the first/second decade of March. Approximately 100 m of nylon mist nets (3.5 m high x 18 m long, mesh size 28 mm) with five shelves were used. There were seven sessions of mist-netting per decade, carried out in the afternoon, from at least three hours before sunset until dark. In total, 43 capture sessions were conducted in 2012, 44 in 2013 and 49 in 2014. Nets were checked every hour; captured birds were placed individually in cotton bags, processed a short distance away from the netting sites, and released immediately after ringing and measurements were completed, usually within 15 minutes. Furthermore, to locate the *main area of origin of the marked birds*, we examined a sample of 152 foreign recoveries that took place in Latium.

The birds were marked with alloy rings applied above the tarsus. The following measurements were taken for each bird: wing length (maximum chord method, Svensson 1992), using a stopped ruler to the nearest 0.5 mm; third primary length (flattened and straightened, Berthold and Friedrich 1979 (to 0.5 mm); tarsus length (Svensson 1992), using a caliper (0.1 mm). Body mass was measured using a digital balance (0.1 g) and visible fat was scored on a scale from 0 to 8 (Kaiser 1993). Age

was determined according to the moult limit between moulted greater coverts (with rounded pale spots on the tips) and juvenile retained coverts (usually with triangular spots on the tips) (Svensson 1992). The data were combined for analysis and fitted into standard decades (Berthold 1973).

During the study period regular observations were conducted, lasting one hour for each capture session; all thrushes that passed within about 30 m of the nets were counted.

RESULTS

In total, 341 Song Thrushes were captured from 2012 to 2014. In all three years the first capture session took place on January 11, and the final session took place on 10 March 2012, 17 March 2013 and 13 March 2014.

The number dynamics of the catches in standardized decades is shown in Figure 1. The number and distribution of catches show quite different patterns in each of the three years. In 2012, the number of captured birds in the first three decades of the study (January 11 to February 10) represented only 14% of the entire sample; starting in the second decade of February there was a slight but steady increase until it reached a sharp peak in the first decade of March, which corresponded to 59% of the total sample. In 2013, a fairly high number of captured birds was recorded in the last two decades of January (50.9%) and a number of retraps occurred in subsequent decades, from a minimum of 15 to a maximum of 41 days after the first ringing. Throughout February the number of captured birds was nearly constant, with percentages around 11-13%, and retraps occurred until the last days of the month. From the first days of March there was a sharp decline, although a modest increase in the number of captured birds was again observed in the second decade, with the latest ringed on March 17. In 2014, a fair percentage of captures (28.5%) were concentrated in the last two decades of January and a number of retraps occurred several days after ringing. From the first decade of February there was a modest increase in

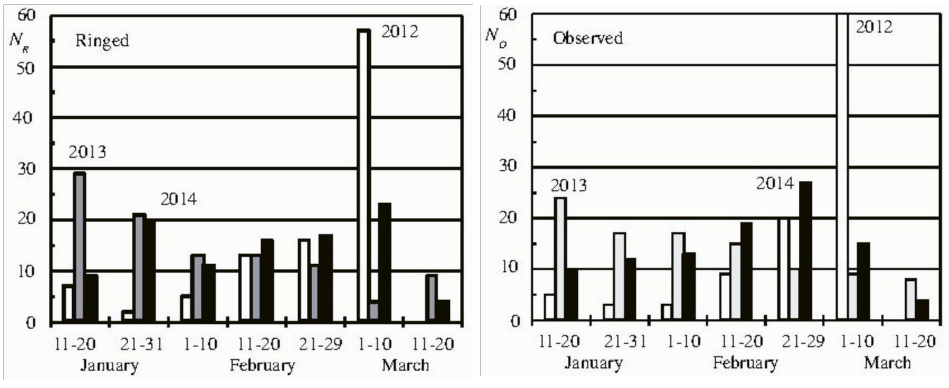

Fig. 1. Occurrence of Song Thrushes in each decade from January to March in 2012-2014 as expressed by numbers of ringed ($N_{\square}$ – left panel) and observed individuals ($N_{\square}$ – right panel)

captures that reached its peak in the first decade of March and then decreased dramatically in the second, in which the percentage of captures was only 4.8%.

The number of birds recorded during the observations in standardized decades is shown in Figure 1, which shows the pattern for each year separately. The observations made in the area surrounding the nets during the working hours of the ringing station essentially followed the pattern of captures (Fig. 2).

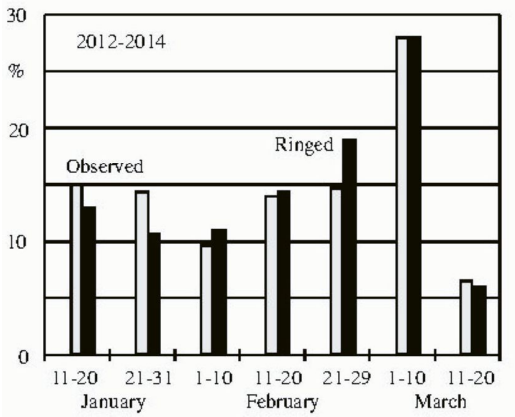

Fig. 2. Comparison of results of the estimation of number dynamics determined by ringing and visual observations.

The number of sightings is indicative of the wintering individuals passing through the ringing station at sunset to reach roosting sites. Over the entire study period 7255 birds were counted: 1009 in 2012, 5082 in 2013 and 1164 in 2014.

Of 341 thrushes ringed over three years, 39 were controlled, of which 10 were captured in the next year following ringing, and two after two years; in addition, 12 recaptures were made after a period of 1 to 8 days and 20 after a period of 13 to 56 days. Examination of the body mass of these individuals showed a decrease of 1.0 to 5.8 g or a minimal increase of 0.7 to 1.0 g for all birds ringed by the end of February compared to 6 individuals captured in March, which showed an increase in weight of 0.7 to 4.6 g (Fig. 3).

Figure 4 shows the average body mass changes per decade. It should be noted that the lowest mean weight was recorded in the first ten days of February, while from the following decades the mean increased, with the highest values recorded in the last three decades of activity.

Since an increase in body mass depends on fat deposits, Figure 5 shows the percentage of individuals with a fat score greater than or equal to 3. Birds with large fat deposits (scores 3 and 4) represent only 11.4% of the total sample and are concentrated between the second decade of February and the second decade of March, while the remaining 88.6% had fat reserves that were very small or none at all (scores 0-2).

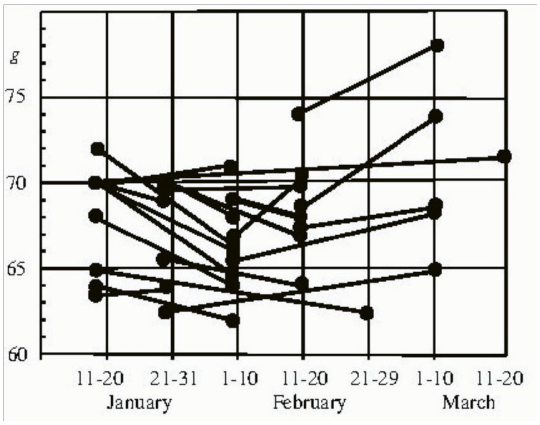

Fig. 3. Changes in body mass (g) of retrapped individuals of the Song Thrush. Weights of the same birds measured on different occasions are connected with a line.

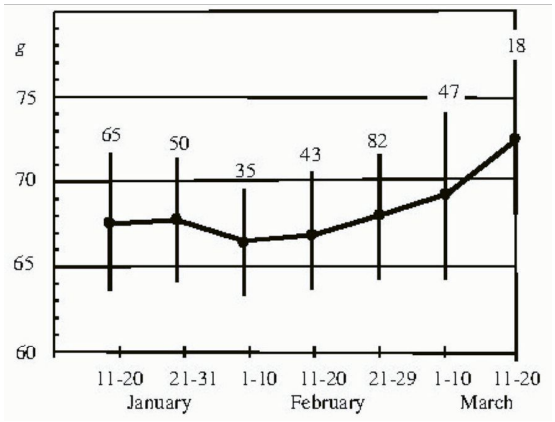

Fig. 4. Variation in mean body mass in each decade from January to March. Data from years 2012-2014 combined. Sample sizes for each decade are given.

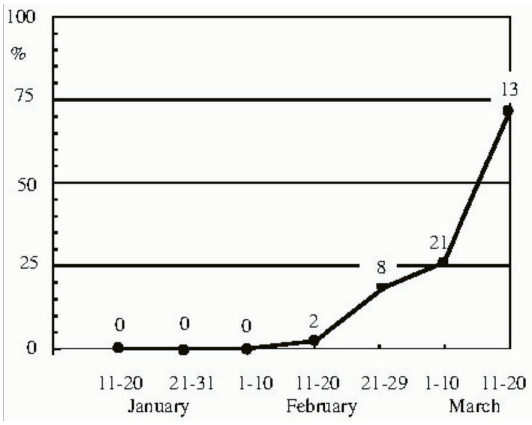

Fig. 5. Percentage of fatty birds (with a visible fat score of at least 3), during the study. Data from years 2012-2014 combined. Numbers of fatty birds in successive decades are given.

Mean wing lengths, third primary lengths and tarsus lengths calculated for separate years and for all years combined are presented in Table 1. The values obtained for the three morphometric variables did not differ from year to year.

Table 1

Measurements (in mm) of Song Thrushes ringed during the period from 11 January to 20 March, 2012-2014. Mean, *SD* and *N* are given.

	Wing	Third primary	Tarsus
2012	118.8 ± 2.82 103	89.2 ± 2.34 103	32.4 ± 0.85 99
2013	118.9 ± 2.50 179	88.9 ± 2.25 179	32.4 ± 0.89 178
2014	118.7 ± 2.82 71	88.7 ± 2.56 70	32.5 ± 0.89 70
All years combined	118.8 ± 2.67 353	88.9 ± 2.34 340	32.5 ± 0.88 335

DISCUSSION

The biometric measurements suggest that the population of thrushes visiting the area is fairly homogeneous. The mean wing length, in particular, recorded for birds captured during this study is consistent with the values obtained in the period from January to March in the province of Salerno in Campania (118.6 mm in 2013 and 118.7 mm in 2014) (Scebba 2014) and in the years 1997-1999 (118.6 mm, $SD = 2.80$, $N = 647$) (Scebba and Moschetti 2000) and 2003-2005 (118.5 mm, $SD = 2.48$, $N = 1\,340$) (Scebba 2006) for birds ringed in autumn on the Volturno Plain (Caserta), about 50 km from the ringing station of Pianara. It is therefore possible that these three capture sites intercept the same northward migratory flow along the south-Tyrrhenian coast.

The spatial analysis of data of birds ringed in other countries during the breeding season and recovered in Latium indicates one main area of origin of these thrushes, i.e. central-eastern Europe. Some 69% of recoveries of foreign-ringed birds are from Hungary, Slovakia and the Czech Republic.

The data collected indicate that the study area is mainly visited by wintering thrushes that concentrate at the site of capture by moving from pastures to night-time roosts. The analysis of the capture data and observations confirms that from year to year there may be more or less marked fluctuations in the number of birds visiting the area during the winter, probably due to erratic movements in relation to food availability and weather conditions.

When autumn migration is over, the birds wintering in the area remain during the months of January and February and sometimes until March, as confirmed by the recoveries of thrushes ringed in January and recaptured in early March. In addition, re-

covery data recorded after a period of one or two years showed that several individuals were faithful to the wintering area.

Bairlein and Gwinner (1994) state that the phenomenon of hyperphagia (gross food intake), whereby birds accumulate fat, is observed in pre-migratory periods. During homeward migration birds are known to make migratory hops with considerable fuel stores, in order to have a safety margin in case of bad conditions at stopover sites and on the breeding grounds (Berthold 1996). Spina *et al*. (2001), based on the captures made in Italy in the years 1982 to 1999, reported that at the beginning of the year the number of birds with large fat deposits decreases slightly and then, due to arrival of migratory birds, increases. During the course of spring migration there is a progressive decrease in the frequency of fatty birds, from the middle of March until the beginning of May, which suggests the movement of birds from northern Africa that have used their energy reserves for crossing the sea. The analysis of average body mass and fat of birds captured during the present study showed that only from the end of February did the birds show significant increases in weight, due to the deposit of fat necessary for the migration, consistent with the onset of the hyperphagia phase. The weight change in the thrushes recaptured in the same season is remarkable in this respect; the majority of individuals taken up to the second decade of February showed a reduction in body weight, while all individuals captured in early March had significant weight increases. This is consistent with the analysis of accumulated fat, which suggests that birds with large fat deposits (scores 3 and 4) have sufficient energy to undertake migration. These represented only 11.4% of the sample and were concentrated between the second decade of February and the second decade of March, while the remaining 88.6% had fat reserves that were very small or none at all (scores 0 and 2). These data also differ from findings by Licheri and Spina (2002), who showed an increase in fat levels as early as the third decade of January and up to the third decade of February. It must be taken into account, however, that the study cited referred to a rather heterogeneous sample, as it included data from birds captured throughout Italy in the years 1982-1999.

Studies carried out in France by the Institut Méditerranéen du Patrimoine Cynégétique et Faunistique with bio-acoustic stations (monitoring of nocturnal calls of birds in flight recorded automatically) from 1991 to 2004 (IMPCF 2001, Ricci 2004) and by the Office National de la Chasse et de la Faune Sauvage from 1991 to 1997 (Roux and Boutin 2003) identified the third decade of February as the start date of pre-nuptial migration in the south of France and in Corsica, a region geographically close to Italy and morphologically quite similar to Sardinia.

Furthermore, recent research carried out in Calabria, a region further south than Latium, indicated that migratory movements of the Song Thrush in the pre-nuptial seasons of 2012 and 2013 became intense from the middle of February (Muscianese *et al*. 2012, 2013). Similarly, long-term studies conducted by ringing with standardized methods showed that in Puglia in 2006 intense migration with a good number of captures occurred in the third decade of March (La Gioia 2012), and established the start date of northward migration in Puglia in the second/third decade of February, with possible exceptions in the last days of January for the years 2011-2013 (Scebba and

La Gioia 2013) and in the second/third decade of February in Campania for 2013-2014 (Scebba 2014).

The results obtained from these investigations should be supplemented by what was reported by Andreotti *et al*. (1999), based on analysis of recaptures of thrushes ringed abroad and recovered in southern Italy, including Sicily. This work showed a constant increase in the presence of birds from the first decade of February, indicating that the actual start of the pre-nuptial migration was in this decade. It should be noted that subsequent publications (Andreotti *et al*. 2004, 2010) on the subject did not report any updates in the table of recoveries with respect to the timing of migration in regions of southern Italy.

On the basis of information gathered during the three years of the investigation it can be assumed that, for Latium, in the study area, and for southern Italy in general, the pre-nuptial migration has not yet started by January 31 but only begins in the second to third decade of February.

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